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IS 12501 (1988): Ferbam, Technical [FAD 1: Pesticides and Pesticides Residue Analysis]



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“Knowledge is such a treasure which cannot be stolen”

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Indian Standard
**SPECIFICATION FOR
FERBAM, TECHNICAL**

UDC 632.951 FER

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Indian Standard

SPECIFICATION FOR FERBAM, TECHNICAL

0. FOREWORD

0.1 This Indian Standard **was adopted by the Bureau of Indian Standards on 24 October 1988**, after the draft finalized **by the Pest Control Sectional Committee** had been approved by the Agricultural and Food Products Division Council.

0.2 Ferbam, technical, is employed in the preparation of fungicidal formulations for use in agricultural crops.

0.3 Ferbam is the accepted common name by the International Organization for Standardization (ISO) for ferric **dimethyl** dithiocarbamate. The empirical, structural formulae, and molecular mass of ferbam are given below:

0.4 In the preparation of this standard, due

consideration has been given to *the* provisions of **the Insecticides Act, 1968** and the Rules framed **thereunder**. However, this standard is subject to the restrictions imposed under these, wherever applicable.

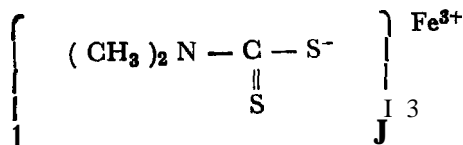
0.5 For the purpose of deciding whether a particular requirement of this standard is **com-**plied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with **IS : 2-1960***. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

*Rules for rounding off numerical values (*revised*).

Empirical Formula



Structural Formula



Molecular Mass

416.5

1. SCOPE

1.1 This standard prescribes the requirements **and** the methods of sampling and test for ferbam, technical.

2. REQUIREMENTS

2.1 Description — The material shall be in the form of homogeneous greyish black powder with no marked odour. It shall be free from extraneous matter.

2.2 The material shall comply with the requirements specified in Table 1.

3. PACKING AND MARKING

3.1 Packing — The material shall be packed in clean and dry containers. The containers shall **comply** with the requirements as stipulated in **IS : 8190 (Part 1) - 1980***.

3.2 Marking — The container shall be securely closed and shall bear legibly and indelibly the following information in addition to the information as required under the *Insecticides Act, 1968*

and Rules framed thereunder:

- a) Name of the material;
- b) Name of the manufacturer;
- c) Date of manufacture;
- d) Batch number;
- e) Ferbam content, percent (m/m);
- f) Net mass of the **contents**; **and**
- g) A minimum cautionary notice worded as in the *Insecticides Act, 1968* and Rules framed thereunder.

3.2.1 Standard Marking — The container may also be marked with the Standard Mark.

NOTE — The use of the Standard Mark is governed by the provisions of the Bureau of Indian Standards Act, 1986 and the Rules and Regulations made thereunder: The Standard Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well defined system of inspection, testing and quality control which is devised and supervised by BIS and operated by the producer. Standard marked products are also continuously checked by BIS for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

*Requirements for packing of pesticides: Part 1 Solid pesticides (first revision).

4. SAMPLING

4.1 Representative samples of the material shall be drawn as prescribed in IS :10946-1984*.

5. TESTS

5.1 Tests shall be carried out by the methods referred to in col 4 and 5 of Table 1.

*Methods of sampling for technical grade pesticides.

NOTE — 'Pure chemicals' shall mean chemicals that do not contain impurities which affect the result of analysis.

5.2 Quality of Reagents — Unless specified otherwise, pure chemicals and distilled water [see IS :1070-1977*, shall be employed in tests.

'Specification for water for general laboratory use (second revision).

TABLE 1 REQUIREMENTS FOR FERBAM, TECHNICAL
(*Clauses 2.2 and 5.1*)

Sl. No.	CHARACTERISTIC	REQUIREMENT	METHOD OF TEST, REFERENCE TO	
			Appendix of this Standard	Clause No. of IS :6940-1982*
(1)	(2)	(3)	(4)	(5)
	i) Ferbam content, percent by mass, Min	81.0	A	
	ii) Moisture content, percent by mass, Max	1.0	—	4.2

*Methods of test for pesticides and their formulations (*first revision*).

APPENDIX A

[*Table 1, Item (i)*]

A-0. GENERAL

A-0.1 Either of the two methods, namely, the carbon disulphide method (see A-1) and the amine method (see A-2) may be used for determination of ferric dimethyl dithiocarbamate content. However, the carbon disulphide method shall be the referee method in case of dispute.

A-1. CARBON DISULPHIDE METHOD

A-1.1 Principle — Ferbam on digestion with dilute mineral acid undergoes decomposition and liberates carbon disulphide. This on reaction with methanolic potassium hydroxide forms potassium methyl xanthogenate which is estimated by titration with standard iodine.

A-1.2 Reagents

A-1.2.1 Lead Acetate Solution — 10 percent (*m/v*).

A-1.2.2 Sulphuric Acid — 1.1 N.

A-1.2.3 Methanolic Potassium Hydroxide Solution — 2 N, prepared by dissolving 112 g of pure potassium hydroxide in one litre of anhydrous methanol.

A-1.2.4 Dilute Acetic Acid — 30 percent (*v/v*).

A-1.2.5 Standard Iodine Solution — 0.1 N.

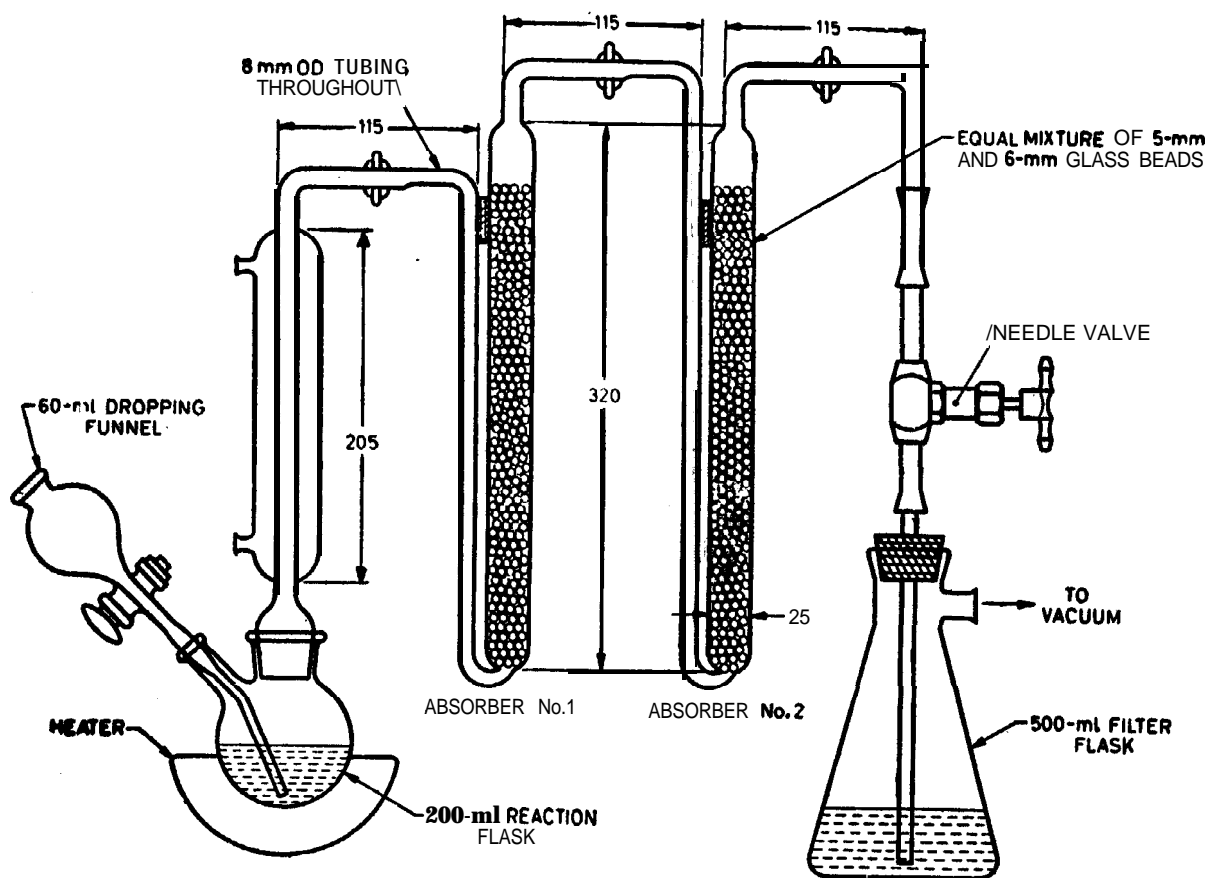
A-1.2.6 Starch Indicator Solution — freshly prepared.

A-1.2.7 Phenolphthalein Indicator Solution — 1 percent (*m/v*) in 96 percent ethyl alcohol.

A-1.3 Apparatus — The apparatus shall be as shown in Fig. 1 and shall consist of a 200-ml flask fitted with a condenser with an outlet tube connected to two absorbers and a 500-ml filter flask serving as a bubbler. The latter in turn is connected to a water suction pump. An alternative assembly as illustrated in Fig. 2 of IS : 3900-1975* can also be used.

A-1.4 Procedure — Weigh accurately about 0.3 g of the material and transfer it into the 200-ml reaction flask and connect it to two absorbers, the first containing lead acetate solution (25 ml) dipped in hot water to precipitate sulphides while the other, a solution of potassium hydroxide in methanol (25 ml). The temperature of the second absorber shall be maintained below 15°C by immersing the absorber in a water-bath throughout the test. Apply suction to the system and adjust the bubbling rate to 3-4 bubbles per second in the bubbler containing distilled water. Add 50 ml of hot sulphuric acid through an inlet tube and reflux under suction for 1 hour and 45 minutes. Discontinue heating and transfer quantitatively the contents of the potassium hydroxide absorber into a 500 ml iodine flask, washing with distilled water, taking care not to use more than 100 ml of the same. Cool the

*Specification for Ziram, technical (*first revision*).



All dimensions in millimetres.

FIG. 1 ASSEMBLY OF APPARATUS FOR THE DETERMINATION OF FERBAM CONTENT

flask and neutralize with 30 percent acetic acid solution using phenolphthalein solution as the indicator. Add starch indicator solution and titrate immediately against 0.1 N standard iodine solution till the colour changes to faint blue.

A-1.5 Calculation

$$\text{Ferbam content, percent by mass} = \frac{V \times N \times 13.87}{M}$$

where

V = volume, in ml, of standard iodine solution used;

N = normality of standard iodine solution; and

M = mass, in g, of the material taken for test.

A-2. AMINE METHOD

A-2.1 Principle — Ferbam on hydrolysis with mineral acid decomposes to carbon disulphide, dimethylamine and iron salt. After boiling off carbon disulphide, the mixture is distilled under alkaline condition to liberate dimethylamine which is estimated by titration with a standard acid.

A-2.2 Reagents

A-2.2.1 Standard Hydrochloric Acid Solution — 0.2 N.

A-2.2.2 Boric Acid Solution — 20 g per litre of water containing 10 ml of 0.05 percent methyl red and 0.7 ml of 0.35 percent methylene blue solutions,

A-2.2.3 Sulphuric Acid — approximately 5 M.

A-2.2.4 Sodium Hydroxide Solution — approximately 7.5 M.

A-2.2.5 Methyl Red Indicator Solution — 0.05 percent.

A-2.3 Apparatus

A-2.3.1 For Hydrolysis — a 150-ml round bottom flask and a reflux condenser.

A-2.3.2 For Distillation — a 1-litre round bottom flask fitted with a dropping funnel and a splash head which is connected to an upright bulb condenser fitted at its outlet with a rubber tube which dips inside a 500-ml conical flask.

A-2.4 Procedure — Weigh accurately 0.5 to 0.8 g of the material into 150-ml round bottom flask and add to it, 50 ml of sulphuric acid. Attach a water-cooled reflux condenser to the flask and heat the contents slowly with occasional shaking to reflux. Allow to reflux for 1 hour, cool and transfer the contents quantitatively to the distillation flask keeping the total volume around 500 ml. Distil until 200 ml of distillate is collected. Discard this distillate which contains water along with some amount of carbon disulphide and cool the distillation flask to room temperature. Place 50 ml of boric acid solution in the distillate receiver (the rubber tube fitted to the outlet of the bulb condenser should dip just inside the boric acid solution). Add a few drops of methyl red indicator followed by sodium hydroxide solution through the dropping funnel so as to neutralize the contents of the distillation flask. Add 10-15 ml of sodium hydroxide in excess and 100 ml of distilled

water and distil the liberated amine, Collect about 250 ml of the distillate in the receiver and titrate with standard hydrochloric acid solution to violet end point. Carry out a blank test on the reagents.

A-2.5 Calculation

$$\text{Ferbam content, percent by mass} = \frac{(t_1 - t_2) \times N \times 13.88}{M}$$

where

t_1 = titre, in ml, of standard hydrochloric acid solution required for the sample;

t_2 = titre, in ml, of standard hydrochloric acid solution required for the blank;

N = normality of standard hydrochloric acid solution; and

M = mass, in g, of the material taken for test.